Log 308

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

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Forwarded to:

Admiral James S. Gracey
Commandant
U.S. Coast Guard
Washington, D.C. 20593

SAFETY RECOMMENDATION(S)

M-85-120 and -121

About 2230 on November 17, 1984, the U.S. tug M/V CELTIC and the barge CAPE RACE, which was secured to the tug's starboard side, suddenly sank in Long Island Sound, Connecticut, resulting in the loss of both vessels and the loss of the tug's six-man crew. The tug and the barge, loaded with scrap iron, were en route from Bridgeport, Connecticut, to Port Newark, New Jersey, and were about 6 miles south of Norwalk, Connecticut, at the time of the accident. The value of the two vessels and cargo was estimated to be about $500,000. 1/

The most probable explanation of the sinking is that the CAPE RACE, which was loaded to a safe freeboard, sustained a hull failure resulting in an opening in the underwater hull. The barge probably took sufficient water forward to plunge the bow underwater, resulting in critical downflooding into the cargo compartment through holes in the coaming, and to sink bow first; as the barge sank it pulled the tug underwater with it.

The material condition of the CAPE RACE probably was comparable to that of the barge's sister barges CAPE BORER and HERBERT E. SMITH, which had suffered considerable deterioration in the double bottoms, including the transverse framing that maintains the shape of the bottom shell plating against the force of buoyancy. When the CAPE RACE was drydocked in October 1984, it did not have a dent in the bottom as was observed in the bottom of the HERBERT E. SMITH. The CAPE RACE had a leaking problem when it was drydocked and building up of the midships butt weld, where the leak was located, was attempted in order to restore the weld and to stop the leak. When welding could not be accomplished because wastage had reduced the thickness of the metal adjacent to the weld, the owner decided to have a 1-foot-wide, 36-foot-long doubler plate welded onto the bottom to cover the weld. The sections of doubler plate were attached using only a fillet weld on each side of the plate. A doubler plate attached to the hull with fillet welds provides very little additional strength to the hull. Further, it is possible that some undercutting into the bottom plate of the barge occurred as the welding was performed, and undercutting could have resulted in cracks forming in the bottom plate of the barge. In addition to the potential for undercutting in the bottom

1/ For more detailed information, read Marine Accident Report--"Sinking of the U.S. Tug M/V CELTIC and Barge CAPE RACE, Long Island Sound, Connecticut, November 17, 1984" (NTSB/MAR-85/12).

plate, a doubler plate creates an area of stress concentration that may induce a fracture in a wasted or thin plate. Installation of the doubler plate to stop the water leak may have weakened the bottom structure of the barge.

The long interval from 1974 to 1984 between drydockings, when there was no periodic repainting of the bottom or replacement of the zinc anodes, probably contributed significantly to the wastage of the welds in the bottom of the CAPE RACE and the plate adjacent to the weld that had become too thin to weld. Concurrent with the deterioration of the bottom plating, there was probably severe wastage in the transverse framing in the double bottoms since this condition was observed in the CAPE BORER and HERBERT E. SMITH. Deterioration of the frames in the double-bottom area would have resulted in unequal stress on the bottom plating, probably allowing some of the plating to be buckled upward by the force of buoyancy and to undergo tension when the barge was loaded. Tension and buckling in the vicinity of doubler plates, weak welds, thin plates, or cracks can lead to major fractures. Calculations indicated that the amount of flooding to reduce the forward freeboard to zero in about 2 1/2 hours would have required an opening in the bottom of about 1 square foot in area, which could have resulted from a fracture 1 inch wide and several feet long. The Safety Board concludes that such a fracture probably occurred in the bottom shell plating of the CAPE RACE, considering the installation of a doubler plate across the entire bottom, the probability of other weak butt welds, and deteriorated internal structure.

In order for a steel vessel like the CAPE RACE to withstand the corrosive effects of salt water, its hull must be protected by the periodic application of anticorrosion paint or coatings, and the vessel's hull also must be provided with cathodic protection such as by zinc anodes attached to the underwater hull. Similarly, the internal structure should be protected by paint or appropriate coatings. The Safety Board believes that the lack of maintenance over the past several years allowed the CAPE RACE to deteriorate to such a poor material condition that massive hull failure was probable almost anywhere in its underwater hull, and that similar hull failures in sister barges involved in carrying scrap iron, such as the HERBERT E. SMITH and CAPE BORER, are also possible. The deteriorated condition of these three barges could occur since such barges are not required to be inspected by the U.S. Coast Guard (USCG) and therefore are not required to comply with any regulations regarding drydocking and repairs. In contrast to the protracted docking interval of 10 years for the CAPE RACE, barges such as tank barges, which are subject to USCG regulations, must be drydocked and inspected every 2 to 3 years. If the CAPE RACE had been subject to USCG regulations, the use of a doubler plate to stop a leak in a wasted weld in the bottom plating would not have been permitted. Established USCG practice is to cut out the wasted portion of the plate and install an insert or replacement plate.

The scrap iron trade constitutes arduous employment for a barge, particularly for an old barge that is not well maintained. The loading and unloading of scrap iron through the use of large grapples results in dents and holes. The dropping of large loads from a grapple or an electromagnet also results in dents and holes as well as cracks in the hull. Rather than bear the cost of continually repairing all holes and cracks as they occur, some owners defer some repairs and concentrate on those repairs essential to keeping the barge afloat. Repairs often are accomplished as cheaply as possible, without full regard to the ultimate strength or condition of the vessel. Since there are no minimum standards or any regulations that cargo barges on inland waters must meet, the condition of barges can vary greatly depending upon the maintenance policy of the owner and the trade in which the barges are employed. In particular, the condition of some scrap barges can be very poor, as disclosed by this investigation, and they can pose a danger to the tugs and crews

involved in towing them. Also, open sounding holes in the main deck, lack of handrails in certain areas, and deteriorated wooden walking platforms in the rake compartments pose hazards to personnel who routinely must come onboard to take soundings or make repairs.

The Safety Board reported on another accident 2/ in recent years in which an uninspected cargo barge, the CONTAINER TRANSPORT No. 1, sustained a hull failure causing the barge to flood and capsize. In that case holes had occurred in the hull as a result of wastage. The operator also had failed to maintain watertight integrity between compartments by allowing several manholes to tanks to be left unsecured. The barge, which carried containers between Baltimore, Maryland, and, Norfolk, Virginia, operated in a saltwater environment, and was not adequately maintained. Like the CAPE RACE, it was not subject to any USCG standards for inspection or maintenance.

All seagoing barges of 100 gross tons or greater are subject to USCG standards for inspection and maintenance; however, similar barges, such as the CAPE RACE and the CONTAINER TRANSPORT No. 1, which operate on saltwater routes through harbors, bays, and sounds are exempt. The Safety Board believes that some regulation of commercial barges of 100 gross tons or greater that navigate on such saltwater routes may be warranted to ensure that they meet minimum safe material standards.

It is probable that the CELTIC's crew was diligent and had checked both barges, but detected nothing critically wrong with the CAPE RACE. A call to the tug's operator by the CELTIC's mate after getting underway from Bridgeport clearly indicated that nothing was known to be wrong. However, many scrap barges are old and in poor condition, and while careful inspection of them may considerably reduce the potential danger to the tug while towing such barges alongside or ahead, as is accepted practice for controlling a tow in confined waters, the possibility of a serious structural failure in a scrap barge is not remote. This accident demonstrates that even a barge which was recently drydocked for bottom repairs can suffer a hull failure. Even if the accident had happened in daylight, the crew still might not have had time to let go of the barge or for all crewmembers to escape from the tug, assuming that a very large hole developed through a massive structural failure.

The mate apparently recognized that something was wrong and had time to reverse the engines. If the CELTIC had been equipped with a means to release the towing lines to the CAPE RACE remotely from the pilothouse, the mate probably would have had time to release the barge and save the tug. The Safety Board recognizes that the use of quick-release devices may require that the towing lines be rigged differently and that it may be necessary to have a wire pendant connected to the end of each towing line, as was fitted on some of the CELTIC towing lines, in order to facilitate connecting the end of the towing line to the hook of the quick-release device. However, the Safety Board believes that towing vessels should be equipped with some means so that a tow can be released quickly and remotely from the pilothouse.

The search conducted by the USCG was timely and effective. Search efforts were facilitated by an oil slick caused by diesel oil leaking from the CELTIC, which was detected early on November 19, 1984, by a USCG cutter. The cutter effectively employed a nearby USCG helicopter to locate the origin of the slick, and readily accepted an offer from a passing fishing vessel, equipped with a fathometer having a graph recorder, to sound the area in order to determine the precise location and existence of any vessels on the bottom.

2/ Marine Accident Reports, Summary Format, Issue No. 5, "Capsizing of Barge CONTAINER TRANSPORT No. 1, Norfolk, Virginia, December 22, 1978" (NTSB-MAB-82-4).

If the CELTIC had carried an emergency position indicating radio beacon (EPIRB), particularly the Class C model used in coastal waters which transmits on channel 16, it is probable that the USCG would have become aware almost immediately that there was a sinking in Long Island Sound. The USCG could have located the EPIRB in a few hours and calculated the probable position of the sunken vessels. In this accident, even if deployed from the CELTIC, an EPIRB probably would not have resulted in saving lives. The principal benefit would have been in reducing the time and resources required to locate the sunken vessels. Since EPIRBs have become comparatively inexpensive and can contribute to shorter, more effective search efforts, enhancing the possibility of saving lives, the Safety Board believes that vessels which operate beyond the limits of harbors should carry them.

Therefore, the National Transportation Safety Board recommends that the U.S. Coast Guard:

> Publish by all available means to the towing industry the circumstances of the sinking of the tug CELTIC and barge CAPE RACE in Long Island Sound on November 17, 1984, and emphasize the desirability for towing vessels to have a means to release their barges remotely from the pilothouse. (Class II, Priority Action) (M-85-120)
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> Encourage the operators of uninspected commercial vessels which operate beyond the limits of coastal harbors to carry emergency position indicating radio beacons (EPIRBs). (Class II, Priority Action) (M-85-121)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and LAUBER, Member, concurred in these recommendations.

By: Jim Burnett
Chairman